

Black-Box Model Era for Financial Institutions: Ethical Responsibility and Legal Liability

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Abstract

As new technologies become increasingly prevalent in every industry, financial services will continue to implement black-box models into their decision-making processes at a growing rate. These can provide enhanced efficiencies, precision and control over their risk, but the lack of visibility into these models' inner workings results in major ethical and legal implications. This editorial examines how financial services organisations are addressing the various issues surrounding automated financial decision-making, including accountability, equity, transparency, trustworthiness and liability. It also concludes by outlining a research agenda emphasizing interdisciplinary and empirical approaches to the governance of black-box models in finance.

Key Words: Finance; Banking; Decision making; Artificial Intelligence (AI); Ethics; Law; Regulation

1. Introduction

In recent decades, financial institutions have begun to employ Machine Learning (ML) and Artificial Intelligence (AI) as tools to enhance the efficiency and accuracy of their decision-making capabilities (scoring, creditworthiness, pricing, fraud detection, portfolio management and regulatory compliance). The application of these provides greater efficiency, cost reduction, and time savings, as well as better risk management and increased competitiveness. At the same time, these new technologies have presented numerous challenges from an ethical and legal perspective. Most notably, with the emergence of so-called black box models, questions arise regarding who is responsible for these technologies, who is accountable for them, and whether people can trust these types of systems.

2. Black-Box Models in Modern Finance

The use of quantitative models in finance has a long history, rooted in classical statistical methods and econometric techniques (linear regression-based credit scoring, actuarial risk models, and portfolio optimization). The black box refers to systems and models whose internal logic (or transfer characteristics), even to their creators, is not understood.

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These emerged in electronics in the 1940s [1]. In the financial sectors, black-box modelling began in the late 1990s and early 2000s, driven by advances in computing power, data availability and machine learning techniques [2]. Deep learning architectures and ensemble methods enabled highly accurate predictions for identifying complex, non-linear patterns in large datasets, but they also reinforced the opacity of decision-making processes. As data from big data, cloud computing and advanced analytics become increasingly available, the number of black box models being used for credit scoring, underwriting, claims processing, market surveillance and algorithmic trading is growing [3,4]. The operational benefits of these models, including improved predictive accuracy and scalability, are motivating the use of these model approaches for processing high volumes of data [5]. The interpretability and comprehensibility are lacking in black-box or machine-learned algorithms, which can cause issues when individuals try to understand a particular outcome based on certain assumptions or inputs.

3. Ethical Issues: Responsibility, Fairness and Trust

Since these algorithms can easily determine access to credit, insurance, and other financial services, ethical considerations related to fairness and discrimination have become increasingly important [6]. Virtually every part of an algorithm will have an impact on an individual or a firm, and when it comes to algorithms, institutions must maintain complete ethical responsibility for what they design, deploy and profit from. Treating algorithmically derived decisions as objective or neutral outcomes overlooks the numerous normative values that are involved in designing a model, selecting the feature variables used to train it, and determining the model's objectives.

Additionally, maintaining the confidence of consumers, investors and regulators in the financial system is critical [7]. Therefore, to produce ethical governance for black-box models, a financial institution must expand its view from exclusively focusing on predictive performance to include a more diverse set of responsibilities: fairness, transparency, equity and social responsibility.

4. Legal Liability: Accountability in Automated Decision-Making

The existing legal frameworks presume that those responsible for making the decisions can be held accountable. Proprietary algorithms that automate many decisions by providing black-box models can create harm and discriminatory effects, resulting in an inability to assign and spread liability among multiple potential 'culprits', such as decision-makers, institutions, management, designers, developers and third-party vendors [8,9]. As regulatory and legal changes continue to emphasize the principle that algorithms cannot be delegated the authority to hold an entity accountable, it remains the legal obligation of financial institutions to make decisions affecting their customers and markets independently of their level of automation [10].

Regulators/supervisors also face challenges when determining the degree of compliance when service decisions are made with a lack of visibility into the decision-making logic. There is a requirement for transparent guidelines related to model explainability, documentation and governance of financial institutions' models, which will enable regulators and supervisors to identify areas of concern more effectively.

5. Toward Responsible and Accountable Financial Black Boxes

Nowadays, interdisciplinary collaboration is necessary to connect finance, law, ethics and data science across various disciplines [10]. Second, empirical investigations are needed to examine how black-box models impact financial outcomes for different demographic groups, market segments and the probability of creating new opportunities for inclusion and stability, as well as the likelihood of exacerbating systemic risk and/or inequality. Third, normative and conceptual research will advance our understanding of how responsibility will be distributed among users of automatic decision-making systems by providing the context for what constitutes acceptable regulatory design and governance principles for institutions. Finally, journals such as IJBFIT are essential to the ongoing conversation about the ethical and legal issues related to financial technology and contribute to the body of knowledge.

6. Conclusion

The time we are currently in, known as the "black-box" era marks a major point of progress for banking, finance, and insurance. Advanced predictive models have numerous advantages; however, they also pose serious negative consequences if implemented on a large scale without addressing ethical issues and ensuring legal compliance. Furthermore, this could erode public trust in banks and insurance companies. In addition, ethical obligations and legal responsibilities in these areas of finance cannot be delegated to algorithms, as these ethical and legal responsibilities remain the responsibility of financial institutions. There will be a need for regulatory action, but there will be an ongoing need to support and encourage the academic community to conduct rigorous and interdisciplinary research on the governance of financial technologies in order for the academic community to help create an innovative and efficient financial system while also creating a system that is ethical and responsible.

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